

# Urban Tree Canopy Assessment for Louisville/Jefferson County

Davey Resource Group  
July 22, 2014



# Project Schedule

Task	Timing
Contract/Agreement Signed	April 16, 2014
Data Acquisition	April 2014
Task 1. Kick-off Meeting	May 29, 2014
Task 2: Perform Urban Tree Canopy Imagery Extraction	April 2014
Land Cover Editing	April–July 2014
Send Data to Louisville/Jefferson County Metro Government for Third Party Assessment	July 2014
Complete UTC Analysis and Deliverables	July 2014
Task 3: UTC-Based Prioritized Tree Planting Plans	August-September 2014
Complete Planting Plans and Deliverables	October 2014
Task 4. Report and Deliverables	October 2014
Attend meeting (TBD) Louisville/Jefferson County Metro Government	October 2014

Task	Description
Project Orientation and Kick-off meeting	● Kickoff Meeting
	● Data Acquisition
Task 1: Land Cover Mapping	● Land Cover Extraction
	● Land Cover QA/QC
	● Land Cover Accuracy Assessment
	● Detailed Land Cover Layer (Buildings, Roads, Ag, Wetlands)
	● Current UTC Determination
Task 2: UTC Socio-Demographic and Economic Analysis	● UTC/Census Analysis and Mapping
	● Urban Tree Canopy Factsheet
Task 3: UTC Ecosystem Benefits and Mapping	● i-Tree Ecosystem Benefits Analysis
	● Stormwater Analysis
Task 4: Historic UTC/Land Cover Change Assessment	● UTC Change Analysis
	● Historical Image Assessment
Task 5: Determining Planting Areas	● GIS-Based Possible Planting Areas
Task 6: UTC-Based Planting Areas Analysis	● Prioritized Planting Site Analysis and Mapping
	● Map Booklet of Priority Planting Sites
	● Urban Habitat Assessment
Task 7: UTC-Based Canopy Goal	● GIS-Based Canopy Growth Modeling
	● UTC Calculator
Final Deliverables	● Interim Deliverables
	● Planting Plan Factsheet
	● Final Data Deliverables (GDB, metadata, etc.)
	● Final UTC and Planting Plan Report
	● Final Meeting

## Deliverables per Task



# Louisville UTC Pilot Results

# Pilot Land Cover Results

	2012		2008		2004	
Cover Class	Acres	%	Acres	%	Acres	%
Tree Canopy	1,081.7	14.5	1,150.3	15.5	1,177.0	15.8
Buildings	1,430.9	19.2	1,415.8	19.0	1,379.4	18.5
Road/Railroad	1,142.5	15.3	1,021.8	13.7	964.7	12.9
Other Impervious	1,766.8	23.7	1,593.7	21.4	1,540.6	20.7
Grass/Low-Lying Vegetation	1,186.2	15.9	1,210.2	16.3	1,181.6	15.9
Bare Soil	139.5	1.9	353.1	4.7	502.8	6.8
Open Water	700.0	9.4	698.6	9.4	698.3	9.4

Overall Tree Canopy Loss from 2004 to 2012 = 8.9%

1.1% per year or 11.9 acres per year in the pilot area

or approximately 735 trees per year (@30ft crown diameter)

Tree Canopy Loss from 2008 to 2012 = 6.0%

Tree Canopy Loss from 2004 to 2008 = 2.3%



# Land Cover Metrics

## Calculations for:

- Tree Canopy Acres
- Tree Canopy %
- Impervious Acres
- Impervious %
- Grass/Vegetation Acres
- Grass/Vegetation %
- Bare Soil Acres
- Bare Soil %
- Hydrology Acres
- Hydrology %
- Possible UTC Acres
- Possible UTC %
- Maximum UTC %

## Summary Layers:

- Project Boundary
- Parcels
- Watersheds
- Council Districts
- Sewersheds
- Neighborhoods
- Public/Private
- Zoning/Land Use
- Census Tracts
- Block Groups

	UNIQUE	ACRES	CANOPY_ACRES	CANOPY_PERCENT	IMPERVIOUS_ACRES	IMPERVIOUS_PERCENT	PERVIOUS_ACRES	PERVIOUS_PERCENT	BARE_SOIL_ACRES	BARE_SOIL_PERCENT	WATER_ACRES
	1	0.65695	0.005824	0.886488	0.604832	92.066603	0.034061	5.184749	0.012235	1.862369	0
	2	517.405917	77.978428	15.071035	404.280465	78.136034	32.926218	6.363711	2.208081	0.426373	0.014724
	3	0.019258	0.005331	27.681783	0.013926	72.313162	0	0	0	0	0
	4	0.087465	0.015968	18.256669	0.048438	55.379607	0.023059	26.363998	0	0	0
	5	0.039467	0.019224	48.709594	0.016198	41.049624	0.004045	10.24987	0	0	0
	6	0.159925	0.097779	61.147127	0.045097	28.199051	0.017038	10.653692	0	0	0
	7	0.08986	0.054921	61.118804	0.026573	29.571444	0.008366	9.31003	0	0	0
	8	0.138297	0.073788	53.35505	0.045011	32.548686	0.019497	14.098087	0	0	0
	9	0.156719	0.071361	45.534301	0.047688	30.42877	0.031769	20.271429	0.005902	3.765662	0
	10	0.110435	0.057375	51.953724	0.03684	33.358885	0.00803	7.270806	0.00819	7.416284	0
	11	0.116982	0.068238	58.332477	0.034684	29.649109	0.009259	7.914528	0.004801	4.10408	0
	12	0.05323	0.026763	50.27834	0	0	0.028217	37.900093	0.00625	11.741297	0
	13	0.054579	0.025826	47.318724	0	0	0.028753	52.681492	0	0	0
	14	0.040619	0.040619	100	0	0	0	0	0	0	0
	15	0.039305	0.039305	100	0	0	0	0	0	0	0
	16	0.133223	0.079743	59.857062	0	0	0.05348	40.14313	0	0	0
	17	0.091808	0.060538	65.939566	0.019035	20.73364	0.012235	13.328551	0	0	0
	18	0.225258	0.147303	65.39295	0.038094	16.911441	0.039861	17.69569	0	0	0
	19	0.11251	0.060522	53.793029	0.033005	29.335355	0.018982	16.871375	0	0	0
	20	0.121659	0.061416	50.481908	0.036425	29.939896	0.023819	19.578509	0	0	0
	21	0.11845	0.052657	44.455097	0.04903	41.382838	0.016763	14.151572	0	0	0
	22	0.124827	0.073609	58.968602	0.034926	27.979354	0.016293	13.052338	0	0	0
	23	0.115322	0.054441	47.208121	0.045218	39.209925	0.015683	13.581737	0	0	0
	24	0.096375	0.038733	40.198327	0.027896	28.945756	0.029745	30.864261	0	0	0
	25	0.079649	0.036891	46.31728	0	0	0.042758	53.682965	0	0	0



# Council Districts

DISTRICT 4	2012		2008		2004	
Cover Class	Acres	%	Acres	%	Acres	%
Tree Canopy	499.1	12.0	519.4	12.5	525.8	12.7
Impervious Surfaces	2,311.8	55.7	2,188.4	52.7	2,116.3	51.0
Grass/Low-Lying Vegetation	537.2	12.9	587.7	14.2	547.5	13.2
Bare Soil	104.5	2.5	158.4	3.8	264.5	6.4
Open Water	699.9	16.9	698.6	16.8	698.3	16.8

DISTRICT 6	2012		2008		2004	
Cover Class	Acres	%	Acres	%	Acres	%
Tree Canopy	582.6	17.7	630.9	19.2	651.1	19.8
Impervious Surfaces	2,024.3	61.5	1,842.8	56.0	1,767.4	53.7
Grass/Low-Lying Vegetation	649.0	19.7	622.4	18.9	634.1	19.3
Bare Soil	35.0	1.1	194.7	5.9	238.2	7.2
Open Water	0.0	0.0	0.0	0.0	0.0	0.0

District 4 has lost 5.1% of its Tree Canopy since 2004 (26.7 acres or roughly 207 trees per year)

District 6 has lost 10.5% of its Tree Canopy since 2004 (68.5 acres or roughly 529 trees per year)

# Ecosystem Benefits (from 2012 data)

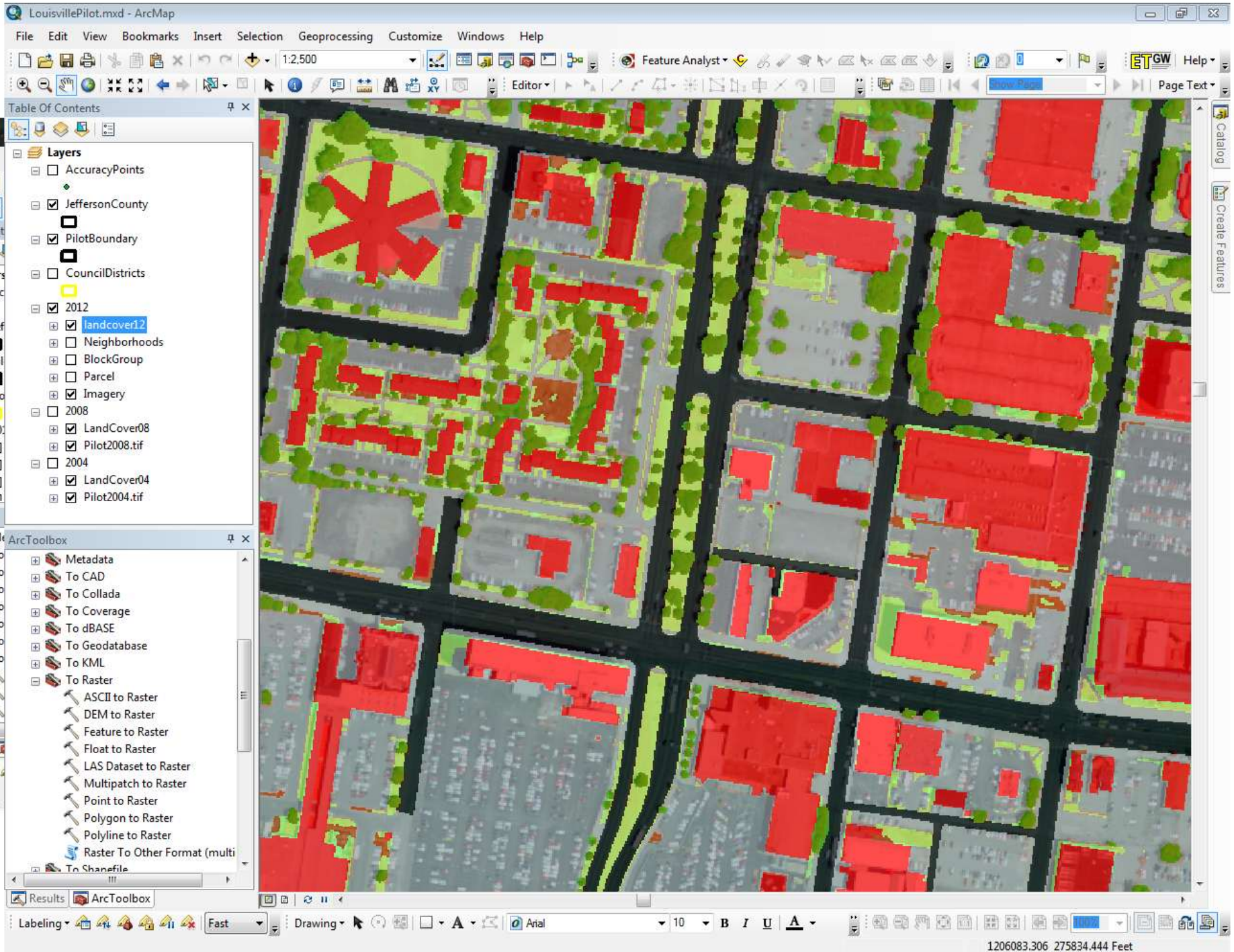
	Air Quality												Carbon					
	CO		NO2		O3		SO2		PM10		Total		Storage		Sequestered		Total	
	Unit (lb)	Value (\$)	Unit (lb)	Value (\$)	Unit (lb)	Value (\$)	Unit (lb)	Value (\$)	Unit (lb)	Value (\$)	Unit (lb)	Value (\$)	Unit (tons)	Value (\$)	Unit tons	Value (\$)	Unit (tons)	Value (\$)
<b>PILOT BOUNDARY</b>	1,430	\$693	6,000	\$1,564	50,660	\$56,732	5,900	\$557	14,720	\$27,326	<b>78,710</b>	<b>\$86,872</b>	162,865	\$3,153,607	5,369	\$103,965	<b>168,234</b>	<b>\$3,257,572</b>
<b>COUNCIL DISTRICTS</b>	1,416	\$687	5,670	\$1,550	50,200	\$56,200	5,840	\$552	14,580	\$27,070	<b>77,706</b>	<b>\$86,059</b>	161,335	\$3,123,982	5,318	\$102,988	<b>166,653</b>	<b>\$3,226,970</b>
Council District 4	654	\$317	2,470	\$716	23,180	\$25,953	2,700	\$255	6,740	\$12,501	<b>35,744</b>	<b>\$39,742</b>	74,505	\$1,442,657	2,456	\$47,560	<b>76,961</b>	<b>\$1,490,217</b>
Council District 6	762	\$370	3,200	\$834	27,020	\$30,247	3,140	\$297	7,840	\$14,569	<b>41,962</b>	<b>\$46,317</b>	86,830	\$1,681,325	2,862	\$55,428	<b>89,692</b>	<b>\$1,736,753</b>

Tree Canopy is providing approximately \$3.34M of benefits for just air quality and carbon reduction for the pilot boundary (~\$3,060/acre).

Council District 4 - \$1.53M

Council District 6 - \$1.78M







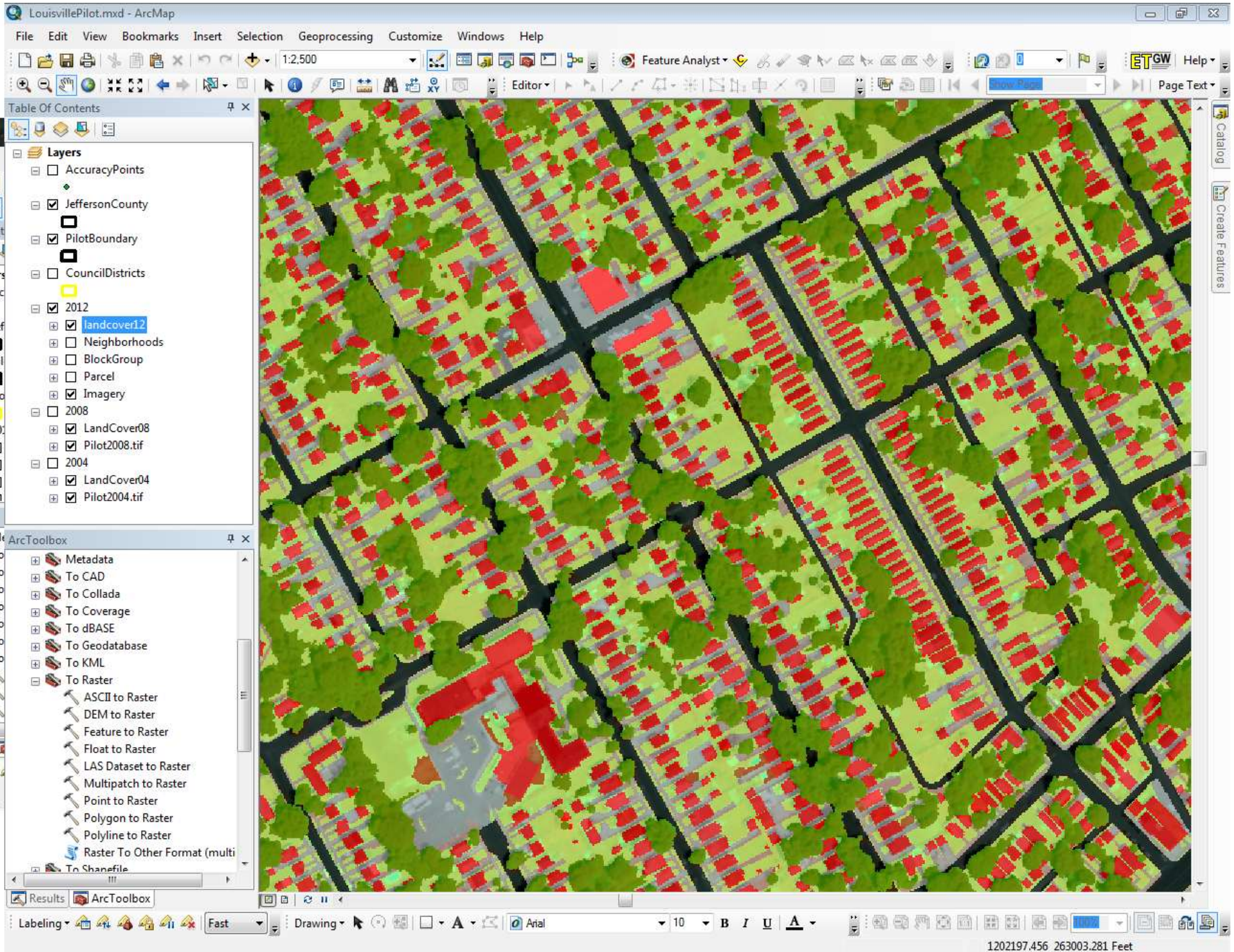




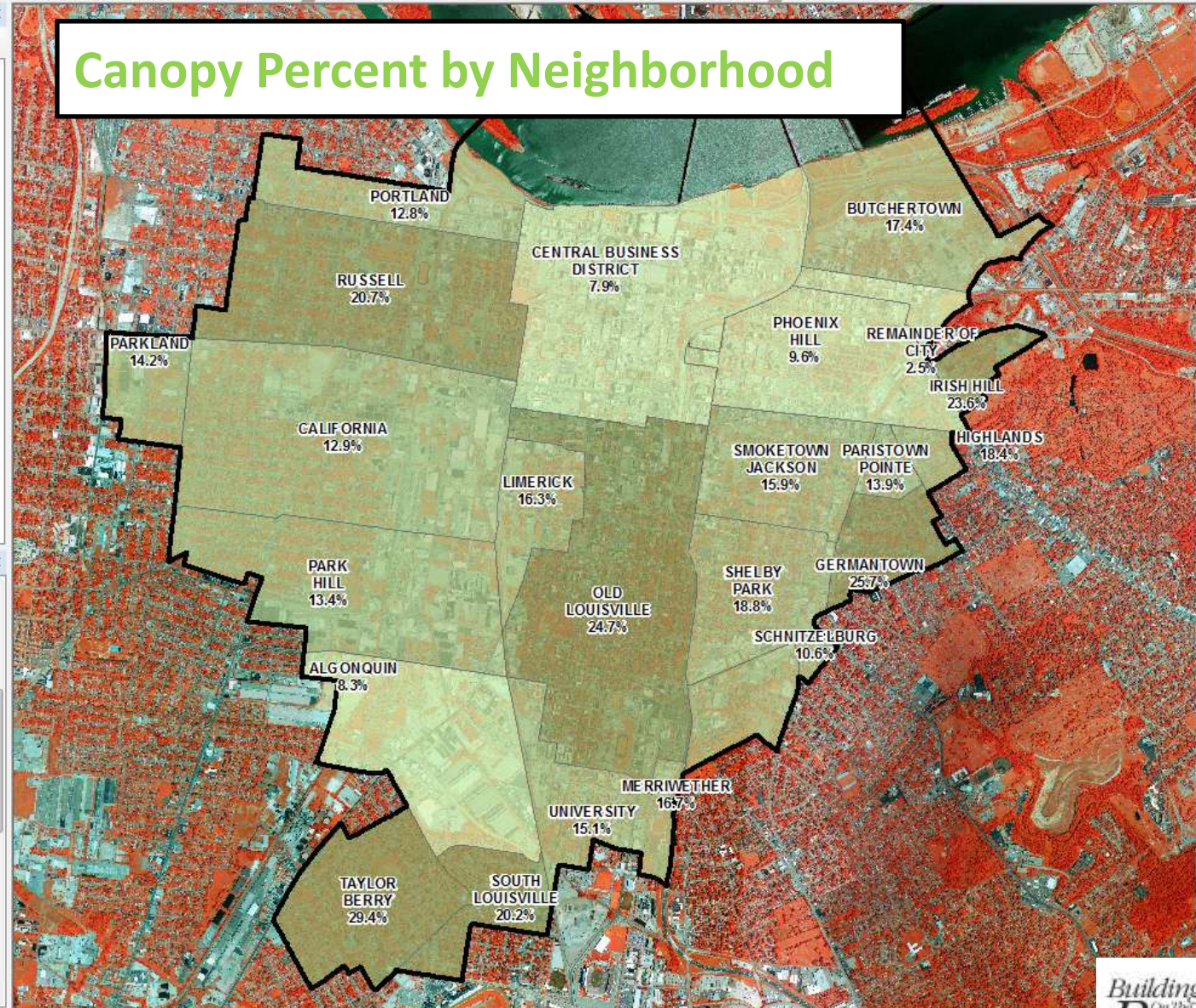
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    - Imagery
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    - LandCover04
    - Pilot2004.tif

ArcToolbox

- Metadata
- To CAD
- To Collada
- To Coverage
- To dBASE
- To Geodatabase
- To KML
- To Raster
  - ASCII to Raster
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  - Feature to Raster
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# Canopy Percent by Neighborhood





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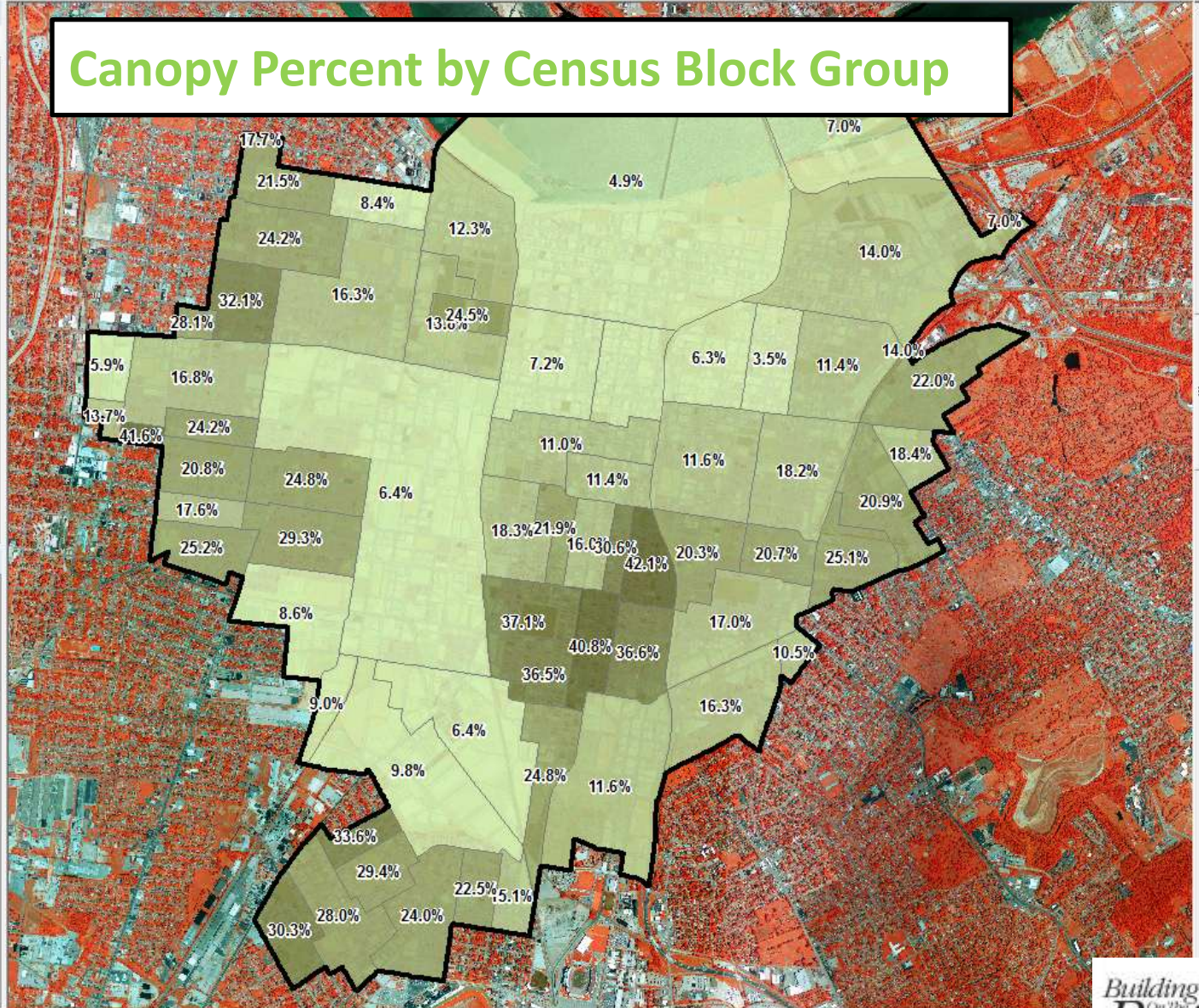
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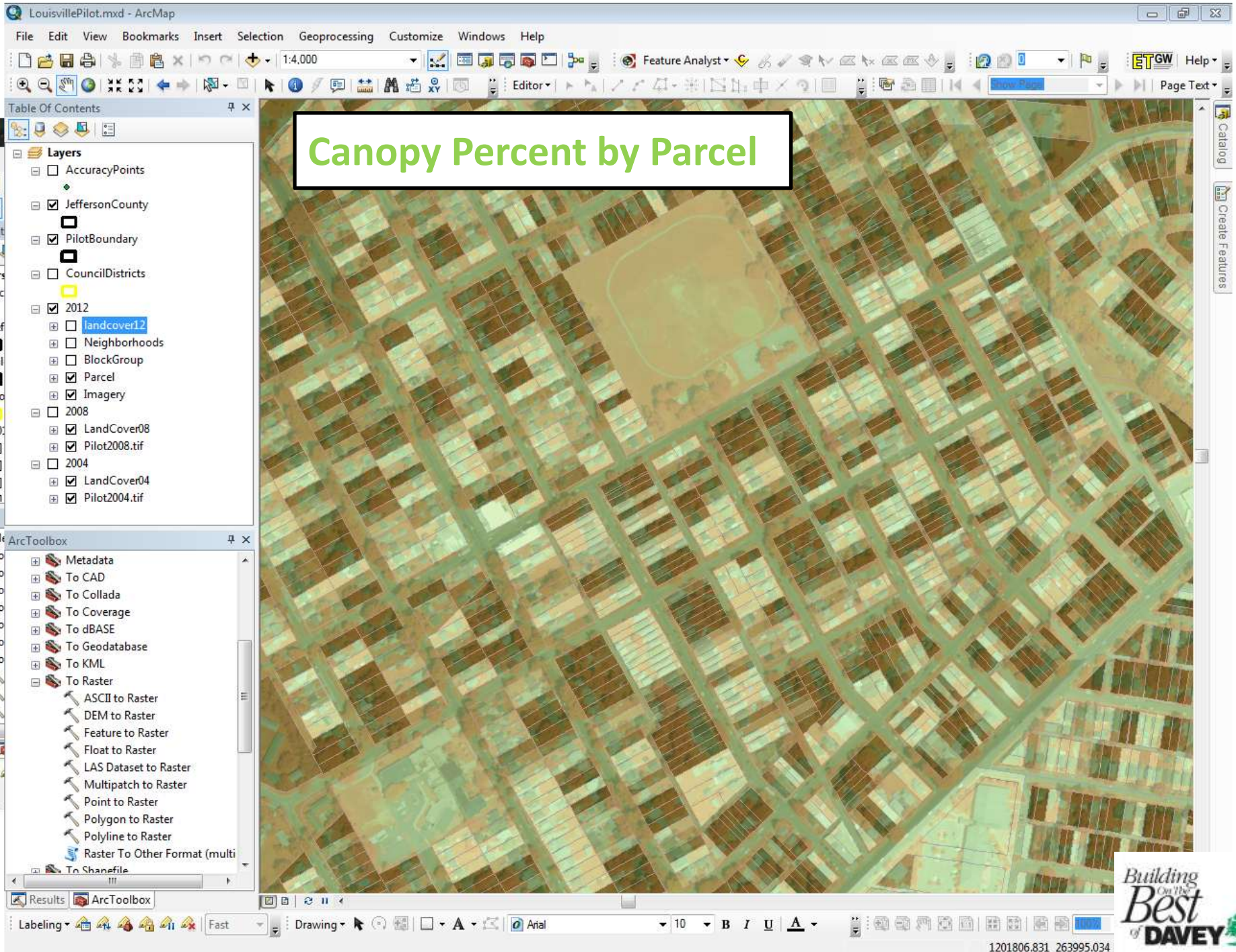
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## Canopy Percent by Census Block Group













## Next Steps

- Complete 2004 and 2008 land cover analysis
- Begin eliminating “unplantable” areas
- Perform socio-economic data analysis
- Perform ecological benefit analysis (air quality, carbon storage, stormwater mitigation)
- Write report



# Questions?

